IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:
Christian Bonnet et al. §

Serial No.: 10/628,153 § Group Art Unit: 1725

Confirmation No.: 4378 §

Filed: July 28, 2003 § Examiner: Maria Alexandra Elve

For: Brazed Copper Heat Exchangers And Process For Manufacturing Them By Welding §

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
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July 2, 2007	/Joseph Jong/
Date	Joseph Jong

Dear Sir:

APPEAL BRIEF – REVISED IN REPSONSE TO NOTICE OF NON-COMPLIANT APPEAL BRIEF DATED MAY 30, 2007

Applicants submit this Revised Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decision of the Examiner of Group Art Unit 1725 dated August 10, 2006, finally rejecting claims 18, 20-39, 42, 46, 47 and 50. The final rejection of claims 39, 42, 46 and 50 is appealed.

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Real Party in Interest

The present application has been assigned to L'Air Liquide, Société Anonyme à Directoire et Conseil de Surveillance pour l'Etude et l'Exploitation des Procédés Georges Claude, Paris, France.

Related Appeals and Interferences

Applicant asserts that no other appeals or interferences are known to the Applicant, the Applicant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

Claims 18, 20-39, 42 and 46-51 are pending in the application. Claims 1-17 were originally presented in the application. Claims 18-51 were added during prosecution. Claims 1-17, 19, 40, 41 and 43-45 have been canceled. Claims 48, 49 and 51 have been withdrawn from consideration. Claims 18, 20-39, 42, 46, 47 and 50 stand finally rejected as discussed below. The final rejections of claims 39, 42, 46 and 50 are appealed. The pending claims are shown in the attached Claims Appendix.

Status of Amendments

All claim amendments have been entered by the Examiner, including amendments to the claims proposed after the final rejection.

Summary of Claimed Subject Matter

INDEPENDENT CLAIM 39

In independent claim 39, a process for manufacturing a copper heat exchanger (Abstract) includes at least one collecting and distributing container (*see* paragraph [0057], and Figures 1-3). The process includes providing the at least one collecting and distributing container (*see* paragraph [0041], and Figures 1-3). The process further includes providing a copper heat exchanger (*see* paragraph [0057], and Figure 3 reference number 10). The copper heat exchanger includes a brazed matrix. The brazed matrix comprises a copper and phosphorus (*see* paragraph [0042]). The brazed matrix is supported by a stack of several plates separated by fins (*see* paragraph [0041], and Figures 2 and 3). The fins form spacers between the plates (*see* paragraph [0041]). At least one layer of an alloy is deposited on at least part of the brazed matrix (*see* paragraph [0042]). The alloy is a copper and tin alloy comprising at least 1.0% weight of tin (*see* paragraph [0054]). The container is then welded to at least one layer of the brazed matrix (*see* paragraph [0041]).

INDEPENDENT CLAIM 50

In independent claim 50, a method used for welding a metal workpiece onto a brazed zone is disclosed (see para [0053] and [0066]). The method comprises creating a brazed zone comprising a copper/phosphorus alloy on a first workpiece (see para [0042]). At least one additional layer comprising a copper/tin alloy with at least 1% tin by weight is deposited on at least part of the brazed zone. (see para [0037])A second workpiece is then welded to the additional layer (see para [0041]). The additional layer protects the brazed zone during the welding (see para [0046]).

Grounds of Rejection to be Reviewed on Appeal

1. Rejection of claim 50 under 35 U.S.C. § 103(a) as being unpatentable over *Quaas* (USPN 3,392,017) in view of *Davidian et al*. (USPN 6,347,662, herinafter *Davidian*).

2. Rejection of claims 39 and 42 under 35 U.S.C. § 103(a) as being unpatentable over of *Davidian* in view of either *Quaas* or *Clarke* (USPN 4,423,618) or *Harris* (USPAP 2003/0021717).

3. Rejection of claim 46 under 35 U.S.C. § 103(a) as being unpatentable over of *Davidian* in view of *Quaas*.

ARGUMENTS

1. Rejection of claim 50 under 35 U.S.C. § 103(a) as being unpatentable over *Quaas* in view of *Davidian*.

The Examiner bears the initial burden of establishing a *prima facie* case of obviousness. *See* MPEP § 2142. To establish a *prima facie* case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one ordinary skill in the art to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *See* MPEP § 2143. The present rejection fails to establish at least the third criterion.

The *Quaas* reference is directed to a self fluxing zinc-free low melting copper base alloy which is capable of being deposited by a variety of welding processes. (Abstract). The alloy solves the specific problem having a low melting alloy without having the noxious fumes created by zinc alloys. The alloy is "capable of deposition by a variety of welding processes such as by carbon arc, oxy-fuel, tungsten-inert gas, atomic-hydrogen welding, open arc-welding processes, etc., wherein the copper base alloy can be utilized in a multiplicity of physical embodiments, such as for example cast rods, tubular rods, electrode rods, powders, etc." (Col. 1, ln. 37-43). The alloy is at least a copper-phosphorus-tin alloy having varying percentages of each metal. The alloy is never specifically described as being brazed. Further, the alloy is never discloses as being deposited onto another brazed alloy. As noted by the Examiner the *Quaas* reference does not teach forming a heat exchanger in the arc welding process.

The *Davidian* reference teaches a heat exchanger comprising a plurality of plates made of copper, nickel or aluminum or an alloy of these metals. (Abstract). The plates "are brazed to one another. . ." (Col. 2, ln. 64-65). The only process described for connecting the plates is by brazing, not welding. The metal used to braze the plates together is a copper alloy. The reference does not disclose brazing the one copper

alloy onto a separate brazed alloy. The Examiner states that "*Davidian et al*. does not specifically teach the presence of phosphorus."

The Examiner states that the *Quaas* reference discloses welding which uses a copper based alloy that also contains tin (4-25%) and phosphorous (0.1-1%), The balance being copper. (Final office action, dated August 10, 2006). The Examiner admits that the *Quaas* reference does not teach forming a heat exchanger in the arc welding process, but argues that the *Davidian* reference teaches a heat exchanger which is brazed together. (Final office action, dated August 10, 2006). The Examiner states "*Davidian et al.* discloses a heat exchanger comprised of a plurality of plates made of copper, aluminum or stainless steel. The exchanger is made of a stack of vertical and parallel rectangular plates between spacer corrugations that also form fins are interposed. . . These plates are attached using a brazing filler material." The Examiner goes on to state that it "would have been obvious to one of ordinary skill in the art at the time of the invention to direct the welding process, as taught by *Quaas et al*. to the *Davidian et al*. heat exchanger because this is merely an application of the arc welding process."

Respectfully, Applicants submit that even if the references are combined as suggested by the Examiner, the combination does not teach all the claimed elements, thereby failing to establish a prima facie case of obviousness. The cited portions of the *Quaas* reference and the *Davidian* reference (and, in fact, the references as a whole) fail to teach depositing at least one additional layer onto at least part of said brazed zone then welding a second workpiece to said additional layer, as required by claim 50. As is known by one of ordinary skill in the art, brazing is a distinct process from welding. Brazing is a process for joining similar or dissimilar metals using a filler metal that typically includes a base of copper combined with silver, nickel, zinc or phosphorus. Brazing differs from welding in that brazing does not melt the base metal; therefore, brazing temperatures are lower than the melting points of the base metals. Welding on the other hand is a process for joining similar metals by melting and fusing two metals together. The *Quaas* reference specifically discloses an alloy for welding. The *Davidian* reference discloses making a copper heat exchanger by exclusively brazing the plates together. Therefore, neither reference, alone or in combination, teaches

welding a workpiece to an alloy which itself has been deposited on a brazed zone comprising another alloy, as claimed.

Specifically, the *Quaas* reference refers to separate alloys that may be used in separate welding operations. The alloys are all copper based alloys and contain phosphorus, as detailed in Examples 1-20, of the *Quaas* reference. Each of the 20 alloy examples are described as being weld deposited or welded metal spray onto a base metal. (*see* entire *Quaa*s patent). The *Quaas* reference never discloses depositing these separate and distinct alloys onto one another in layers, as required by the claim.

The *Quaas* reference does not disclose brazing the alloy. Further, the *Quaas* reference never discloses depositing an additional alloy layer onto a brazed zone, wherein the brazed zone is created by brazing a separate alloy onto a workpiece. The only reference in the *Quaas* reference to combining one of the 20 alloys with another material is the use of an alloy as a matrix for supporting carbide. The *Quaas* reference uses this particular alloy as a matrix or base filler for supporting the carbide. The carbide in the alloy provides a hard surface adapted for cutting, for example in a drilling or milling tool. (Col. 4, ln. 18-34). This carbide impregnated alloy matrix is an end product used to cut. No separate alloy is deposited onto this matrix. Further, the *Quaas* reference does not disclose welding another workpiece to any of the 20 alloys disclosed, after the alloy has been deposited onto a base metal (brazed or otherwise).

In an attempt to overcome the deficiencies of the *Quaas* reference the Examiner relies on the *Davidian* reference. However, as in the *Quaas* reference, the *Davidian* reference does not disclose layering or depositing an alloy onto a separate and distinct alloy layer (the claimed "brazed zone"). The *Davidian* reference strictly refers to brazing the plates of a copper heat exchanger together. (Col. 2, ln. 64-67). The alloy used by the *Davidian* reference is a copper or an alloy comprising at least 80% copper. (Col. 3, ln. 15-16). The reference makes no mention of depositing separate alloys onto one another during brazing or welding operations. Further, the brazing of the copper alloy is not required to have separate alloys because the plates, exchanger and the brazed alloy are all copper and it is commonplace connect these using a brazed copper alloy connection. There is no reason (in the references were given by the Examiner) to put

one layer of the copper alloy on the connection and then retrieve a separate alloy and deposit that separate alloy on the connection in order to prepare that connection for yet another operation in order to connect the copper plates.

Further, the *Davidian* reference makes no mention of welding a workpiece to an additional alloy layer which is on top of a brazed alloy layer or zone. The *Davidian* reference acknowledges a distinction between a welding and a brazing process by requiring the inlet pipe to by welded to the outside of the header of the heat exchanger. (Col. 3, ln. 4-5). The inlet pipe and the header are both made of stainless steel and therefore a welding operation is advantageous, as a welding operation will not harm the stainless steel on the outside of the exchanger. This is in specific contrast to the copper plates which specifically require a brazing operation be performed for connection. There is no mention in the *Davidian* reference of performing a brazing operation and a welding operation at the same connection.

Thus, the combination of the *Davidian* reference with the *Quaas* reference does not teach or suggest all of the claim limitation. Even if one of ordinary skill in the art were to used one of the alloys from the *Quaas* reference in order to braze the alloy on the connection of the *Davidian* reference, there is no teaching in either reference to then deposit a separate alloy on the first alloy, and then to weld to the separate alloy. Further, neither reference teaches any process that combines brazing and welding. Therefore, the combination of the *Quaas* reference and the *Davidian* reference does not render the claims obvious.

2. Rejection of claims 39 and 42 under 35 U.S.C. § 103(a) as being unpatentable over of *Davidian* in view of either *Quaas* or *Clarke* or *Harris*.

The Examiner bears the initial burden of establishing a *prima facie* case of obviousness. *See* MPEP § 2142. To establish a *prima facie* case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one ordinary skill in the art to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or

references when combined) must teach or suggest all the claim limitations. *See* MPEP § 2143. The present rejection fails to establish at least the first and the third criterion.

The Examiner states that the *Davidian* reference discloses a heat exchanger comprised of a plurality of plates made of copper, aluminum or stainless steel. The exchanger is made of a stack of vertical and parallel rectangular plates between which spacer corrugations that also form fins are interposed. Each pair of plates delimits a passage of flat overall shape. (Final office action, dated August 10, 2006). The Examiner admits that the *Davidian* reference does not disclose phosphorus. In an attempt to make up for this deficiency, the Examiner relies alternatively on the *Quaas* reference, the *Clarke* reference or the *Harris* reference.

As discussed above, the combination of the *Davidian* reference with the *Quaas* reference does not teach or suggest providing two separate alloys and welding to a brazed matrix, as required by claims 39 and 42. Therefore, for the reasons discussed above, the combination of the *Quaas* reference and the *Davidian* reference does not render the claims obvious.

Alternatively, the Examiner relies on the combination of the *Davidian* reference with the *Clarke* reference. The Examiner states, "*Clarke* discloses brazing of heat exchangers using phosphorous bearing copper filler metal." The *Clarke* reference discloses process components that can be joined using phosphorus-bearing copper filler metal with little or no silver content to make a brazed joint. (Abstract). The connection is typically between two fluid conduits in an air conditioning unit or refrigerator. The specific problem solved is the hardening of a connector so that the connector will not deform during the brazing operation. The hardening of the connector is accomplished by mechanically expanding the annealed copper connector. The connector may then be brazed onto the fluid conduit. (Col. 3, ln. 20-56). The "tolerances in the brazed joints are rather critical. . ." (Col. 3, ln. 36-37). The connection is brazed one time by one copper alloy on each side of the connector. There is no mention of using separate alloys, or layering the alloys during the brazing operation. Further, a welding operation is not disclosed in the *Clarke* reference. In fact, if a welding operation were used in the *Clarke* reference the connector and conduit

would be damaged and the critical tolerance of the conduit would be destroyed. Therefore, the *Clarke* reference does not teach welding a container to a layer of a brazed matrix.

Therefore, the combination of the *Davidian* reference with the *Clarke* reference does not teach or suggest at least one layer of an alloy containing copper and tin being deposited on at least part of the brazed matrix and welding a container to at least one layer as required in claims 39 and 42. Neither the *Davidian* reference nor the *Clarke* references disclose welding the connection. Because, as discussed above, the *Davidian* reference does not include welding to a brazed matrix, the addition of phosphorus from the *Clarke* reference does nothing to cure the deficiencies of the *Davidian* reference. Further, both references specifically teach away from welding the brazed connection. Therefore, the combination of the *Davidian* reference and the *Clarke* reference does not render the claims obvious.

In another alternative, the Examiner relies on the combination of the *Davidian* reference with the *Harris* reference in order to overcome the lack of phosphorus in the *Davidian* reference. The Examiner states that "*Harris* discloses a phosphorus-copper-antimony-tin braze for making ductile brazes in heat exchangers.

The *Harris* reference discloses a phosphorus-copper brazing alloy in order to produce a brazed joint. (Abstract). The *Harris* reference specifically seeks to overcome a problem related to thin flowing alloys creating leak paths after a brazing operation is complete without using silver in the brazing alloy. The reference seeks to accomplish this by forming an alloy comprising phosphorus, tin, antimony and copper, which forms a thicker putty like brazing alloy during the connection of work pieces. The alloy creates a visible sign to the operator that the brazed joint is sound. (Paragraph [0021]). The *Harris* reference refers strictly to a brazing operation. Further, the reference specifically list only one copper alloy for use only during a brazing operation. The specific alloy effectively seals the connection as can be visibly seen by the operator. The *Harris* reference does not mention welding, or a separate alloy.

As with the *Davidian* reference, there is no need, in the *Harris* reference to use a separate alloy to further secure the completed connection. There is no teaching in the

Harris reference to then weld to the brazed connection. Because, as discussed above, the *Davidian* reference does not include welding to a brazed matrix, the addition of phosphorus from the *Harris* references does nothing to cure the deficiencies of the *Davidian* reference. Therefore, the combination of the *Davidian* reference and the *Harris* reference does not render the claims obvious.

3. Rejection of claim 46 under 35 U.S.C. § 103(a) as being unpatentable over of *Davidian* in view of *Quaas*.

Claim 46 depends from claim 39. As stated above, the combination of the *Davidian* reference in view of the *Quaas* reference does not render claim 39 obvious. Therefore, claim 46 is not rendered obvious by the combination of the *Davidian* and *Quaas* reference.

CONCLUSION

The Examiner errs in finding that:

1. Claim 50 is unpatentable over *Quaas* in view of *Davidian*;
2. Claims 39 and 42 are unpatentable over of *Davidian* in view of either *Quaas* or *Clarke* or *Harris*; and
3. Claim 46 is unpatentable over of *Davidian* in view of *Quaas*.

Withdrawal of the rejections and allowance of claims 39, 42, 46 and 50 is respectfully requested.

Respectfully submitted, and
S-signed pursuant to 37 CFR 1.4,

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CLAIMS APPENDIX

Claims 1- 17 (cancelled)

Claim 18 (previously presented): A process for preparing a metal workpiece for arc welding, said process comprising depositing at least one layer of an alloy onto a matrix, wherein:

(a) said alloy comprises copper and at least about 1.0% tin by weight;

(b) said matrix comprises at least one brazed zone; and

(c) said brazed zone comprises copper and phosphorus.

Claim 19 (cancelled)

Claim 20 (previously presented): The process according to Claim 18, wherein said copper/tin alloy comprises at least about 1.05% tin by weight.

Claim 21 (previously presented): The process according to Claim 20, wherein said copper/tin alloy comprises at least about 1.2% tin by weight.

Claim 22 (previously presented): The process according to Claim 21, wherein said copper/tin alloy comprises less than about 10% tin by weight.

Claim 23 (previously presented): The process according to Claim 22, wherein said copper/tin alloy ranges from about 2% to about 8% tin by weight.

Claim 24 (previously presented): The process according to Claim 23, wherein said copper/tin alloy ranges from about 3% to about 6% tin by weight.

Claim 25 (previously presented): The process according to Claim 18, wherein said copper/tin alloy comprises at least about 80% copper by weight.

Claim 26 (previously presented): The process according to Claim 25, wherein said copper/tin alloy comprises at least about 90% copper by weight.

Claim 27 (previously presented): The process according to Claim 18, wherein said copper/tin alloy comprises less than about 1% phosphorus by weight.

Claim 28 (previously presented): The process according to Claim 18, wherein several copper/tin alloy layers are deposited.

Claim 29 (previously presented): The process according to Claims 18, wherein deposition of said layers comprise the steps of:

(a) preheating the alloy zone to be coated;

(b) supplying and melting copper/tin alloy via an electric arc; and

(c) depositing said melted alloy in the preheated alloy zone.

Claim 30 (previously presented): The process according to Claim 29, wherein said preheating is carried out by using at least one electric arc.

Claim 31 (previously presented): The process according to Claim 30, wherein said arc is generated by a TIG or a plasma welding torch.

Claim 32 (previously presented): The process according to Claim 29, wherein said copper/tin alloy is supplied in the form of a wire.

Claim 33 (previously presented): The process according to Claim 29, wherein said melting is generated by at least one MIG or TIG welding torch.

Claim 34 (previously presented): The process according to Claim 18, wherein said at least one layer of copper and tin alloy has a phosphorus solubility limit that ranges from about 0.1% to about 3.5% by weight at the solidification temperature.

Claim 35 (previously presented): The process according to Claim 18, wherein said brazed matrix is supported by a stack of several plates separated by fins forming spacers between the plates, said fins and plates being brazed to one another so as to form said brazed matrix.

Claim 36 (previously presented): The process according to Claim 35, wherein said workpiece comprises copper or stainless steel.

Claim 37 (previously presented): The process according to Claim 35, wherein the brazed matrix is part of a brazed copper heat exchanger and the workpiece is at least one fluid collecting and distributing container.

Claim 38 (previously presented): The process according to Claim 37, wherein said collecting and distributing container comprises copper.

Claim 39 (previously presented): A process for manufacturing a copper heat exchanger comprising at least one collecting and distributing container that comprises the steps of:

(a) providing at least one collecting and distributing container,

(b) providing a copper heat exchanger comprising a brazed matrix supported by a stack of several plates separated by fins forming spacers between said plates, at least one layer of an alloy containing copper and tin being deposited on at least part of the brazed matrix, said copper/tin alloy comprising at least 1.0 weight % of tin, said brazed matrix comprising copper and phosphorus, and

(c) welding said container to said at least one layer of the brazed matrix.

Claim 40 (cancelled)

Claim 41 (cancelled)

Claim 42 (previously presented): The process according to Claim 39, wherein said fluid collecting and distributing container comprises copper or stainless steel.

Claim 43 (cancelled)

Claim 44 (cancelled)

Claim 45 (cancelled)

Claim 46 (previously presented): The process according to Claim 39, wherein said copper/tin alloy comprises tin in an amount selected from the group consisting of:

(a) at least about 1.05% tin by weight;
(b) at least about 1.2% tin by weight;
(c) less than about 10% tin by weight;
(d) about 2% to about 8% tin by weight; and
(e) about 3% to about 6% tin by weight.

Claim 47 (previously presented): The process according to Claim 35, wherein said matrix and/or said workpiece is a component of a fluid collecting and/or distributing container that forms part of a heat exchanger.

Claim 48 (withdrawn): A heat exchanger comprising a brazed matrix supported by a stack of several plates separated by fins forming spacers between said plates, at least one layer of an alloy containing copper and tin being deposited on at least part of the brazed matrix, said copper/tin alloy comprising at least 1.0 weight % of tin, and further comprising at least one collecting and distributing container welded on said at least one layer of the brazed matrix.

Claim 49 (withdrawn): A heat exchanger according to claim 48, which is made of copper.

Claim 50 (previously presented): A method which may be used for welding a metal workpiece onto a brazed zone, said method comprising:

a) creating a brazed zone on a first workpiece, wherein said brazed zone comprises a copper / phosphorus alloy;

b) depositing at least one additional layer onto at least part of said brazed zone, wherein:

1) said additional layer comprises a copper / tin alloy; and

2) said copper / tin alloy comprises at least about 1.0 % tin by weight; and

c) welding a second workpiece to said additional layer, wherein said additional layer protects said brazed zone during said welding.

Claim 51 (withdrawn): An apparatus which may be used as a heat exchanger, said apparatus comprising:

a) at least one fluid distributing and collecting container;

b) at least one intermediate material, wherein:

1) said intermediate material comprises a copper / tin alloy;

2) said copper / tin alloy comprises at least about 1.0% tin by weight; and

3) said collecting container is welded to said intermediate material; and

c) a matrix, wherein:

1) said matrix comprises a plurality of plates separated by a plurality of fins;

2) said plates and said fins are brazed together in at least one brazed zone;

3) said brazed zone comprises a copper / phosphorous alloy; and

4) said intermediate material is deposited over said brazed zone.

EVIDENCE APPENDIX

There is no evidence attached.

RELATED PROCEEDINGS APPENDIX

Since there are no related proceedings, no copies of decisions rendered are included.